ADOPTING STANDARDS TO MEET TRADE TRAINING REQUIREMENTS

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The authorities at Cass Technical High School have found it necessary to issue certificates to evening school and continuation students who have completed various lines of work. When the time came to classify a man as a machinist, the question "What is a machinist?" was put to various employment managers, shop foremen and machinists themselves without finding a clear-cut analysis of the trade requirements.

According to agreement, however, certificates must be given and some school authority must vouch for the ability of the one obtaining such a certificate. Diligent inquiry brought very little help from the employer. Only a very few employers have given any thought to the definite educational or trade requirements necessary for the positions they have to offer. The usual answer one gets when approaching a business man or an employer concerning the definite knowledge his employee should have is "Teach him to think" or to use more exact terms "Teach the boy to use his head and we will do the rest." This, of course, is very definite knowledge upon which to work, and is the very thing for which public schools were established.

After nearly a year of systematic endeavor to establish standards in trade training the instructors at Cass Technical High School have compiled an outline, or schedule, for the various machines in the machine shop, and for bench work, assuming that the man who can operate satisfactorily the lathe, planer, shaper, milling machine, and drill press, and can do vice and assembly work, should be classed as a machinist. Those who can operate only part of these machines should be classified as a lathe hand, a shaper hand, etc., according to the machine or machines he is able to operate. The outline for each machine is made up as follows:

Only the outline for the lathe is given in this article.

Beginning at the left-hand column and reading from top to bottom, is a list of machine operations. Crossing the outline from left to right is given, approximately, the knowledge of the tools, machines, etc., which is required in the corresponding division under the head of machine operations. Full columns mean that the information is general.

These outlines are being used as follows: Students applying at the school for admission into the day or evening classes are given an outline covering the particular machine about which information is sought. If it be, for example, the lathe, the student is asked to check all that he knows about the lathe. This gives at once a starting point, and what is more important, places before the applicant the requirements necessary to qualify as an operator on that particular machine. The combined outlines meet the requirements of the trade.

The management of Cass Technical High School will make arrangements to give all applicants an examination covering the outlines. Those who can qualify according to the schedule and who can show not less than two years' practical shop experience with one company will be given a machinist's certificate by the Board of Education of Detroit.

In making up these outlines each machine was considered as an independent unit. All the information necessary to a complete mastery of the machine was scheduled regardless of how much that information might overlap onto the requirements for other machines.

Finally a grouped chart was made showing special requirements for each machine and the knowledge common to all.

Such a schedule of special and general requirements places before each operator a graphic illustration of just what part of the machinist's trade he has covered, when he has mastered one machine, and also what special information he must obtain if he expects to advance to another machine.

As stated above when a man has demonstrated his ability to do any part of the work called for in the schedule he is given a certificate stating exactly what he can do. This makes it possible for employment managers to employ men more intelligently and it is hoped that in time will lead to the demand that all tradesmen carry certificates issued by the public schools.

Machinist Requirements for Engine Lathe Work

Machine Operation	Knowledge of Machine and Attachments	Tools used on Machine	Machinist's Tools	General Shop Knowledge	Mathematics	Drawing
Care of Centers. Turning on Centers. Turning on Mandrel.	Name, care, and use of the principal parts of Machine: Carriage, apron, crossfeed, compound rest, bed, ways, head stock, tail stock, back gears, change gears, spindle, lead screw, splineshaft.	Wrenches, Dogs, Clamps. Names, care, and use of the Tool-post Set of tools. Solid tools, Armstrong tools. Care, to include Tempering Grinding, and oil stoning.	Steel Rule. Square. Hammer. Center Punch. Scratch Awl. Dividers. Calipers, Inside and Outside. Micrometers, Inside and Outside. Center Gauge. Hermaphrodite calipers. Combination Set. Protractor. Surface Gauge. Center Indicator. Depth Gauge. Vernier Caliper. Bar Caliper. Wiggler. Drill Gauge.	Time Cards. Tool Checking. General Rules for Safety and Sanitation. Belts. Pulleys. Lubricants, to include Oils, Greases, and Cutting Compounds. Counter Shafts. Line Shafts. Cone and Geared-head machines. Motor Drives. Fits and Finishes. Cutting Speeds. Gear Combinations. General knowledge of Thread Systems. Standard V and Square Threads. Special Threads: Double, Triple, etc. Standard Tapers. Names and Uses of Standard Files. Polishing Materials. Use of Hand-books, Catalogs, Reference Books.	Common Fractions. Decimals. Proportion. Simple Percentage. Simple Equations. Use of Formulæ. Measurement of Angles. Measurements of Areas and Volumes. Square Root. Making and Reading of Graphs. Solution of right-angled triangles. Relation of Radii, Diameters, and Circumferences of Circles. Mathematics of: Cutting Speeds, Pulley ratios, Feed gear ratios; Back gear ratios, Taper Computations. Thread Computations, Thread Measurements, Change gears for Thread cutting. Gear Blank Sizes. Mechanics as applied to: Force, Motion, Levers, Pulleys, Wheel and Axle, etc. General Laws of Work, Energy, Power.	Reading of drawings to the extent of ordering stock, making layout for job, and comprehending mechanical requirements. How to make drawings for ordinary machine parts.
Chuck and Face-plate work. Facing. Drilling. Boring. Reaming.	Various kinds of chucks: Independent, Universal, Combination, Collets or Draw-in, and Special. Face-plates. Steady rest. Follower rest.	Face Plate Mountings. Bolts, clamps, parallel strips. Angle plates, etc. Drills, and drill grinding for various metals. Shell and Solid Reamers. Drill Sockets. Drift. Etc.				
Thread Cutting.	Use of Change Gears, Lead Screw, Carriage, and Cross feed Index.	Tool-post set of tools for Thread Cutting. Taps. Dies.	Center gauge for shaping Thread tools. Thread Gauge. Thread Micrometers.			
Taper Turning. Knurling. Filing. Polishing.	Taper attachments. Compound Rest. Tail stock adjustments. Backing-off or relieving attachment	Knurling Tools. Files.				